

NODE=B050

 $\Xi(1820) \frac{3}{2}^-$ $I(J^P) = \frac{1}{2}(\frac{3}{2}^-)$ Status: ***

The clearest evidence is an 8-standard-deviation peak in ΛK^- seen by GAY 76C. TEODORO 78 favors $J = 3/2$, but cannot make a parity discrimination. BIAGI 87C is consistent with $J = 3/2$ and favors negative parity for this J value.

NODE=B050

 $\Xi(1820)$ MASS

We only average the measurements that appear to us to be most significant and best determined.

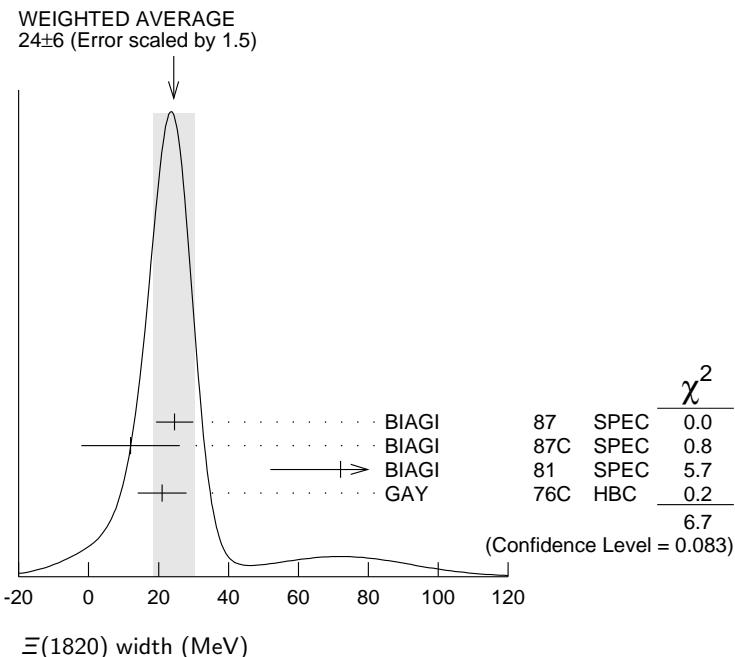
VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
1823 ± 5 OUR ESTIMATE					
1823.4 ± 1.4 OUR AVERAGE					
1819.4 ± 3.1 ± 2.0	280	1 BIAGI	87	SPEC 0	$\Xi^- \text{Be} \rightarrow (\Lambda K^-) X$
1826 ± 3 ± 1	54	BIAGI	87C	SPEC 0	$\Xi^- \text{Be} \rightarrow (\Lambda \bar{K}^0) X$
1822 ± 6		JENKINS	83	MPS —	$K^- p \rightarrow K^+ (\text{MM})$
1830 ± 6	300	BIAGI	81	SPEC —	SPS hyperon beam
1823 ± 2	130	GAY	76C	HBC —	$K^- p$ 4.2 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
1817 ± 3		ADAMOVICH	99B	WA89	Σ^- nucleus, 345 GeV
1797 ± 19	74	BRIEFEL	77	HBC 0	$K^- p$ 2.87 GeV/c
1829 ± 9	68	BRIEFEL	77	HBC —0	$\Xi(1530)\pi$
1860 ± 14	39	BRIEFEL	77	HBC —	$\Sigma^- \bar{K}^0$
1870 ± 9	44	BRIEFEL	77	HBC 0	$\Lambda \bar{K}^0$
1813 ± 4	57	BRIEFEL	77	HBC —	ΛK^-
1807 ± 27		DIBIANCA	75	DBC —0	$\Xi \pi \pi, \Xi^* \pi$
1762 ± 8	28	2 BADER	72	HBC —0	$\Xi \pi, \Xi \pi \pi, YK$
1838 ± 5	38	2 BADER	72	HBC —0	$\Xi \pi, \Xi \pi \pi, YK$
1830 ± 10	25	3 CRENNELL	70B	DBC —0	3.6, 3.9 GeV/c
1826 ± 12		4 CRENNELL	70B	DBC —0	3.6, 3.9 GeV/c
1830 ± 10	40	ALITTI	69	HBC —	$\Lambda, \Sigma \bar{K}$
1814 ± 4	30	BADER	65	HBC 0	$\Lambda \bar{K}^0$
1817 ± 7	29	SMITH	65C	HBC —0	$\Lambda \bar{K}^0, \Lambda K^-$
1770		HALSTEINSLID63	FBC	—0	K^- freon 3.5 GeV/c

NODE=B050M
→ UNCHECKED ← **$\Xi(1820)$ WIDTH**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
24 +15 -10 OUR ESTIMATE					
24 ± 6 OUR AVERAGE					Error includes scale factor of 1.5. See the ideogram below.
24.6 ± 5.3	280	1 BIAGI	87	SPEC 0	$\Xi^- \text{Be} \rightarrow (\Lambda K^-) X$
12 ± 14 ± 1.7	54	BIAGI	87C	SPEC 0	$\Xi^- \text{Be} \rightarrow (\Lambda \bar{K}^0) X$
72 ± 20	300	BIAGI	81	SPEC —	SPS hyperon beam
21 ± 7	130	GAY	76C	HBC —	$K^- p$ 4.2 GeV/c
• • • We do not use the following data for averages, fits, limits, etc. • • •					
23 ± 13		ADAMOVICH	99B	WA89	Σ^- nucleus, 345 GeV
99 ± 57	74	BRIEFEL	77	HBC 0	$K^- p$ 2.87 GeV/c
52 ± 34	68	BRIEFEL	77	HBC —0	$\Xi(1530)\pi$
72 ± 17	39	BRIEFEL	77	HBC —	$\Sigma^- \bar{K}^0$
44 ± 11	44	BRIEFEL	77	HBC 0	$\Lambda \bar{K}^0$
26 ± 11	57	BRIEFEL	77	HBC —	ΛK^-
85 ± 58		DIBIANCA	75	DBC —0	$\Xi \pi \pi, \Xi^* \pi$
51 ± 13		2 BADER	72	HBC —0	Lower mass

NODE=B050W
→ UNCHECKED ←

58	± 13	² BADER	72	HBC	-0	Higher mass	OCCUR=2
103	$+38$ -24	³ CRENNELL	70B	DBC	-0	$3.6, 3.9 \text{ GeV}/c$	
48	$+36$ -19	⁴ CRENNELL	70B	DBC	-0	$3.6, 3.9 \text{ GeV}/c$	OCCUR=2
55	$+40$ -20	ALITTI	69	HBC	-	$\Lambda, \Sigma \bar{K}$	
12	± 4	BADER	65	HBC	0	$\Lambda \bar{K}^0$	
30	± 7	SMITH	65B	HBC	-0	$\Lambda \bar{K}$	
< 80		HALSTEINSILD63	FBC		-0	$K^- \text{freon } 3.5 \text{ GeV}/c$	



$\Xi(1820)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \Lambda \bar{K}$	large
$\Gamma_2 \Sigma \bar{K}$	small
$\Gamma_3 \Xi \pi$	small
$\Gamma_4 \Xi(1530) \pi$	small
$\Gamma_5 \Xi \pi \pi (\text{not } \Xi(1530) \pi)$	

$\Xi(1820)$ BRANCHING RATIOS

The dominant modes seem to be $\Lambda \bar{K}$ and (perhaps) $\Xi(1530) \pi$, but the branching fractions are very poorly determined.

NODE=B050215;NODE=B050

$\Gamma(\Lambda \bar{K})/\Gamma_{\text{total}}$			Γ_1/Γ	
VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.25\pm0.05 OUR AVERAGE				
0.24 \pm 0.05	ANISOVICH	12A	DPWA	Multichannel
0.30 \pm 0.15	ALITTI	69	HBC	$K^- p 3.9\text{--}5 \text{ GeV}/c$

DESIG=1;OUR EST
DESIG=3;OUR EST
DESIG=2;OUR EST
DESIG=4;OUR EST
DESIG=5

$\Gamma(\Xi \pi)/\Gamma_{\text{total}}$			Γ_3/Γ	
VALUE	DOCUMENT ID	TECN	CHG	COMMENT
0.10\pm0.10	ALITTI	69	HBC	$K^- p 3.9\text{--}5 \text{ GeV}/c$

NODE=B050220
NODE=B050220
NODE=B050R1
NODE=B050R1

$\Gamma(\Xi \pi)/\Gamma(\Lambda \bar{K})$			Γ_3/Γ_1		
VALUE	CL%	DOCUMENT ID	TECN	CHG	COMMENT
<0.36	95	GAY	76C	HBC	$K^- p 4.2 \text{ GeV}/c$
0.20\pm0.20		BADER	65	HBC	$K^- p 3 \text{ GeV}/c$

NODE=B050R21
NODE=B050R21

$\Gamma(\Xi\pi)/\Gamma(\Xi(1530)\pi)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
1.5^{+0.6}_{-0.4}	APSELL	70	HBC	0 $K^- p$ 2.87 GeV/c

 Γ_3/Γ_4

NODE=B050R22
NODE=B050R22

 $\Gamma(\Sigma\bar{K})/\Gamma_{\text{total}}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.30\pm0.15	ALITTI	69	HBC	— $K^- p$ 3.9–5 GeV/c

 Γ_2/Γ

NODE=B050R3
NODE=B050R3

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.02

TRIPP 67 RVUE Use SMITH 65C

 $\Gamma(\Sigma\bar{K})/\Gamma(\Lambda\bar{K})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.24\pm0.10	GAY	76C	HBC	— $K^- p$ 4.2 GeV/c

 Γ_2/Γ_1

NODE=B050R31
NODE=B050R31

 $\Gamma(\Xi(1530)\pi)/\Gamma_{\text{total}}$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.30\pm0.15	ALITTI	69	HBC	— $K^- p$ 3.9–5 GeV/c

 Γ_4/Γ

NODE=B050R4
NODE=B050R4

• • • We do not use the following data for averages, fits, limits, etc. • • •

seen

ASTON 85B LASS $K^- p$ 11 GeV/c

not seen

5 HASSALL 81 HBC $K^- p$ 6.5 GeV/c

<0.25

6 DAUBER 69 HBC $K^- p$ 2.7 GeV/c

 $\Gamma(\Xi(1530)\pi)/\Gamma(\Lambda\bar{K})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.38\pm0.27 OUR AVERAGE	GAY	76C	HBC	— $K^- p$ 4.2 GeV/c

 Γ_4/Γ_1

NODE=B050R41
NODE=B050R41

Error includes scale factor of 2.3.

<u>1.0 \pm 0.3</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.26 \pm 0.13	SMITH	65C	HBC	—0 $K^- p$ 2.45–2.7 GeV/c

 $\Gamma(\Xi\pi\pi(\text{not } \Xi(1530)\pi))/\Gamma(\Lambda\bar{K})$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
0.30\pm0.20	BIAGI	87	SPEC	— Ξ^- Be 116 GeV

 Γ_5/Γ_1

NODE=B050R51
NODE=B050R51

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.14

7 BADIER 65 HBC 0 1 st. dev. limit

>0.1

SMITH 65C HBC —0 $K^- p$ 2.45–2.7
GeV/c

 $\Gamma(\Xi\pi\pi(\text{not } \Xi(1530)\pi))/\Gamma(\Xi(1530)\pi)$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
consistent with zero	GAY	76C	HBC	— $K^- p$ 4.2 GeV/c

 Γ_5/Γ_4

NODE=B050R52
NODE=B050R52

• • • We do not use the following data for averages, fits, limits, etc. • • •

<u>0.3\pm0.5</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
8 APSELL	70	HBC	0	$K^- p$ 2.87 GeV/c

 $\Xi(1820)$ FOOTNOTES

¹ BIAGI 87 also sees weak signals in the $\Xi^-\pi^+\pi^-$ channel at 1782.6 ± 1.4 MeV ($\Gamma = 6.0 \pm 1.5$ MeV) and 1831.9 ± 2.8 MeV ($\Gamma = 9.6 \pm 9.9$ MeV).

² BADIER 72 adds all channels and divides the peak into lower and higher mass regions. The data can also be fitted with a single Breit-Wigner of mass 1800 MeV and width 150 MeV.

³ From a fit to inclusive $\Xi\pi$, $\Xi\pi\pi$, and ΛK^- spectra.

⁴ From a fit to inclusive $\Xi\pi$ and $\Xi\pi\pi$ spectra only.

⁵ Including $\Xi\pi\pi$.

⁶ DAUBER 69 uses in part the same data as SMITH 65C.

⁷ For the decay mode $\Xi^-\pi^+\pi^0$ only. This limit includes $\Xi(1530)\pi$.

⁸ Or less. Upper limit for the 3-body decay.

NODE=B050

NODE=B050;LINKAGE=J

NODE=B050;LINKAGE=C

NODE=B050;LINKAGE=A

NODE=B050;LINKAGE=B

NODE=B050;LINKAGE=G

NODE=B050;LINKAGE=F

NODE=B050;LINKAGE=I

NODE=B050;LINKAGE=H

Ξ(1820) REFERENCES

NODE=B050

ANISOVICH	12A	EPJ A48 15	A.V. Anisovich <i>et al.</i>	(BONN, PNPI)	REFID=54041
ADAMOVICH	99B	EPJ C11 271	M.I. Adamovich <i>et al.</i>	(CERN WA89 Collab.)	REFID=47312
BIAGI	87	ZPHY C34 15	S.F. Biagi <i>et al.</i>	(BRIS, CERN, GEVA+)	REFID=40132
BIAGI	87C	ZPHY C34 175	S.F. Biagi <i>et al.</i>	(BRIS, CERN, GEVA+) JP	REFID=40349
ASTON	85B	PR D32 2270	D. Aston <i>et al.</i>	(SLAC, CARL, CNRC, CINC)	REFID=12073
JENKINS	83	PRL 51 951	C.M. Jenkins <i>et al.</i>	(FSU, BRAN, LBL+)	REFID=32525
BIAGI	81	ZPHY C9 305	S.F. Biagi <i>et al.</i>	(BRIS, CAVE, GEVA+)	REFID=32065
HASSALL	81	NP B189 397	J.K. Hassall <i>et al.</i>	(CAVE, MSU)	REFID=32505
TEODORO	78	PL 77B 451	D. Teodoro <i>et al.</i>	(AMST, CERN, NIJM+) JP	REFID=32532
BRIEFEL	77	PR D16 2706	E. Briefel <i>et al.</i>	(BRAN, UMD, SYRA+)	REFID=32345
Also		PRL 23 884	S.P. Apsell <i>et al.</i>	(BRAN, UMD, SYRA+)	REFID=32498
GAY	76C	PL 62B 477	J.B. Gay <i>et al.</i>	(AMST, CERN, NIJM) IJ	REFID=32520
DIBIANCA	75	NP B98 137	F.A. Dibianca, R.J. Endorf	(CMU)	REFID=12062
BADIER	72	NP B37 429	J. Badier <i>et al.</i>	(EPOL)	REFID=32474
APSELL	70	PRL 24 777	S.P. Apsell <i>et al.</i>	(BRAN, UMD, SYRA+) I	REFID=32515
CRENNELL	70B	PR D1 847	D.J. Crennell <i>et al.</i>	(BNL)	REFID=32516
ALITTI	69	PRL 22 79	J. Alitti <i>et al.</i>	(BNL, SYRA) I	REFID=32513
DAUBER	69	PR 179 1262	P.M. Dauber <i>et al.</i>	(LRL)	REFID=11783
TRIPP	67	NP B3 10	R.D. Tripp <i>et al.</i>	(LRL, SLAC, CERN+)	REFID=30418
BADIER	65	PL 16 171	J. Badier <i>et al.</i>	(EPOL, SACL, AMST) I	REFID=32509
SMITH	65B	Athens Conf. 251	G.A. Smith, J.S. Lindsey	(LRL)	REFID=32511
SMITH	65C	PRL 14 25	G.A. Smith <i>et al.</i>	(LRL) IJP	REFID=32510
HALSTEINSLID	63	Siena Conf. 1 73	A. Halsteinslid <i>et al.</i>	(BERG, CERN, EPOL+) I	REFID=32508

— OTHER RELATED PAPERS —

TEODORO	78	PL 77B 451	D. Teodoro <i>et al.</i>	(AMST, CERN, NIJM+) JP	REFID=32532
BRIEFEL	75	PR D12 1859	E. Briefel <i>et al.</i>	(BRAN, UMD, SYRA+)	REFID=32464
SCHMIDT	73	Purdue Conf. 363	P.E. Schmidt	(BRAN)	REFID=32502
MERRILL	68	PR 167 1202	D.W. Merrill, J. Button-Shafer	(LRL)	REFID=11782
SMITH	64	PRL 13 61	G.A. Smith <i>et al.</i>	(LRL) IJP	REFID=32527